OBP Series

Optical Beam Position – Analog version

User's Manual

Newport

EU Declaration of Conformity

This is to certify that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directives.

Model name:	OBP Series
Certificate No:	9412325060
Year CE mark affixed:	2014
Type of equipment:	Optical position and power measurement system, analog interface.

Has been tested and was found to comply with the requirements of:

- **EN 55022 Class B:** "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (2010).

- **IEC 61000-3-3:** "Electromagnetic Compatibility (EMC)", Part 3: "Limits"; Section 3. "Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current < 16 A per phase and not subjected to conditional connection" Ed.2 (2008)

- **EN 55024:** "Information technology equipment – Immunity characteristics – Limits and methods of measurement" (2010).

The undersigned hereby declare that the equipment specified above conforms to the above directive(s) and standard(s).

RoHS Declaration of Conformity

We hereby certify that the following product: OBP Series – USB Version meets the requirements of the European Directive 2002/95/EC (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

This product does not contain any of the six (6) restricted substances as stated below, which are:

- Cadmium (Cd)
- Chromium VI (Cr + 6)
- Polybrominated biphenyl (PBB)
- Polybrominated biphenyl ether (PBDE)
- Lead (Pb)
- Mercury (Hg)

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Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

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Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representative diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?

- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

Table of Contents

Page

EU Declaration of Conformity…… 2
RoHS Declaration of Conformity …… 3
Warranty……4
Confidentiality & Proprietary Rights…… 5
Technical Support Contacts……6
1. Introduction……9
2. Specifications……11
3. Dimensions and Drawings…….. 13
4. Operation…….. 15
5. Accessories…….. 18
6. Troubleshooting…….. 18

List of Figures

Figure 1 OBP main components……..9
Figure 2 Head drawing OBP-A-9L and OBP-A-9H…….. 13
Figure 3 Electronics box…..…… 14
Figure 4 Timing Diagram…….. 15
Figure 5 Connection method of OBP…… 16
Figure 6 Ambient light effect ……..17

1.0 Introduction

OBP is a complete solution for fast and extremely accurate laser position sensing.

Main Features:

- **Versatile –** Measures both Position and Power using two-dimensional position sensitive detectors, either a 9mmx9mm or a 4mmx4mm , Lateral Effect PSD type.
- **Precise** – Large area detection with sub-micron resolution and linearity better than 0.5%
- **Easy to use** – Just connect the output to a scope or DVM to observe movement in μm units (1Volt=1000μm)
- **Compact** – Slim design sensor heads and electronics box

Main Applications:

- Measure laser displacement in real time, at a rate of up to 60 KHz bandwidth
- Measure fast steering mirrors
- Monitor vibration and deflection at high bandwidth from long stand-offs
- Perfect for close loop applications

Figure 1: OBP main components

Contents:

Models OBP-A-4L or OBP-A-4H:

Electronics box, PSD with 3m long attached cable, power supply, power cords (X2), Hood, carrying case, user manual, final testing and compliance verification

Models OBP-A-9L or OBP-A-9H:

Electronics box, PSD with 3m long attached cable, power supply, power cords (X2), carrying case, user manual, final testing and compliance verification

1.1 Precautions

OBP system is a precision instrument and in normal usage will provide years of trouble free operation. However, a few precautions must be taken:

- The instrument must not be subjected to physical abuse. If either the electronics box or detector heads are dropped they might be damaged.
- Temperature and moisture extremes can also damage the instruments. Make sure there is adequate ventilation for the electronics box.
- When not in use, keep a cap over the sensor heads to prevent dust from accumulating on the sensors. Dust, scratches and other types of contamination will degrade the accuracy of the system.
- Do not touch the detector surface by bare fingers

  The operator should observe all laser safety procedures when operating the system. Note that a portion of the laser beam incident on the sensors will be reflected. This can be hazardous and the operator should beware of both specular and diffuse reflections.

1.2 Revision History

Any new editions of this manual will incorporate all material updated since the previous edition. Update packages issued between editions contain replacement and/or additional pages to be appended to the current edition

The manual printing date indicates its current edition. Updates and corrections to the current edition will be indicated:

Dec 2004 – Revision 1.0

Sep 2006 – Revision 2.0

Oct 2014 – Revision 2.1

2.0 Specifications

2.1 General

Parameters	Symbols	Value
Power Supply Voltage	Vs	±18V
Operating Temperature	Topt	0° - 50° C
Current Consumption	Is	±15mA

2.2 Model numbers and ordering information

Newport Model Number	Description
OBP-A-4L	Laser Position Sensor, 4mm Head, 10-2500µW (Low Amplification)
OBP-A-4H	Laser Position Sensor, 4mm Head, 1-250µW (High Amplification)
OBP-A-9L	Laser Position Sensor, 9mm Head, 10-2500µW (Low Amplification)
OBP-A-9H	Laser Position Sensor, 9mm Head, 1-250µW (High Amplification)

2.3 General Specifications

Newport Model Number	OBP-A-4L OBP-A-4H	OBP-A-9L OBP-A-9H
Sensor size	4X4mm	9X9mm
PSD Mechanical dimensions	16mm dia. X 10mm deep	37mm dia. X 11mm deep
Power Input Range	10-2500µW 1-250µW	10-2500µW 1-250µW
Response time	<20 µS	<60µS
Resolution (CW/Pulsed)	1 mV / 5 mV	1 mV / 5 mV
Operating Temperature Range	0 - 50ºc	0 - 50ºc

Conversion factor: 1 mV = 1 ㎜

Range (X,Y): ± 2000 mV (or ± 2000 µm) for the 4mmx4mm PSD (OBP-A-4L or OBP-A-4H)

± 4500 mV (or ± 4500 µm) for the 9mmx9mm PSD (OBP-A-9L or OBP-A-9H)

Wavelength: 350 – 1100 nm

2.4 Power Supply Specifications

The OBP Series contain a universal desktop switching power supply, having the following specifications:

Input Voltage: 90-264 Vac typical

Input Frequency: 47-63Hz

EMI: Meet EN55022 /FCC Class B

Output Wattage: 10W

Line Regulation: 0.1% typical

Load Regulation: +/-1.5 – 3% typical

Noise & Ripple: Typical 1% peak to peak

Safety Standard: UL1950/EN60950 Class II

3.0 Dimensions and Drawings

3.1 9mmX9mm head (140 Gram with cable)

Models OBP-A-9L and OBP-A-9H

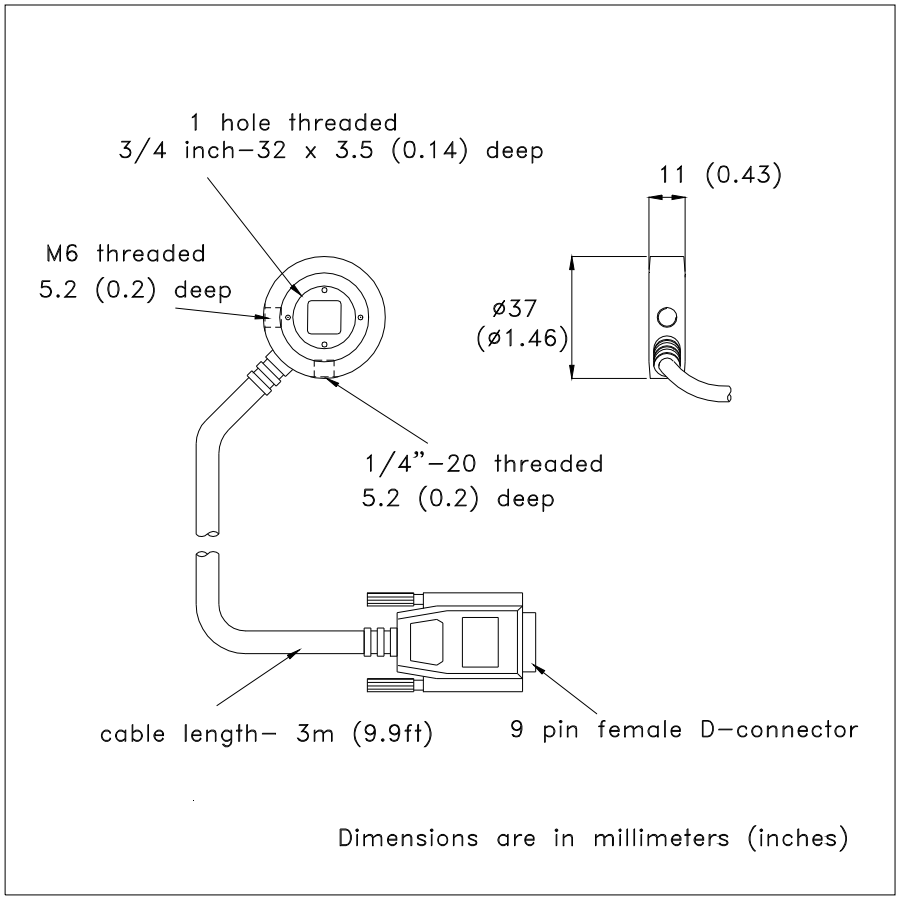

Figure 2: Head drawing OBP-A-9L and OBP-A-9H

3.2 4mmX4mm head (140 Gram with cable)

Models OBP-A-4L and OBP-A-4H have the same dimensions as OBP-A-9L and OBP-A-9H. Refer to Figure 2 for the dimensions.

3.3 Electronics box (125 Gram)

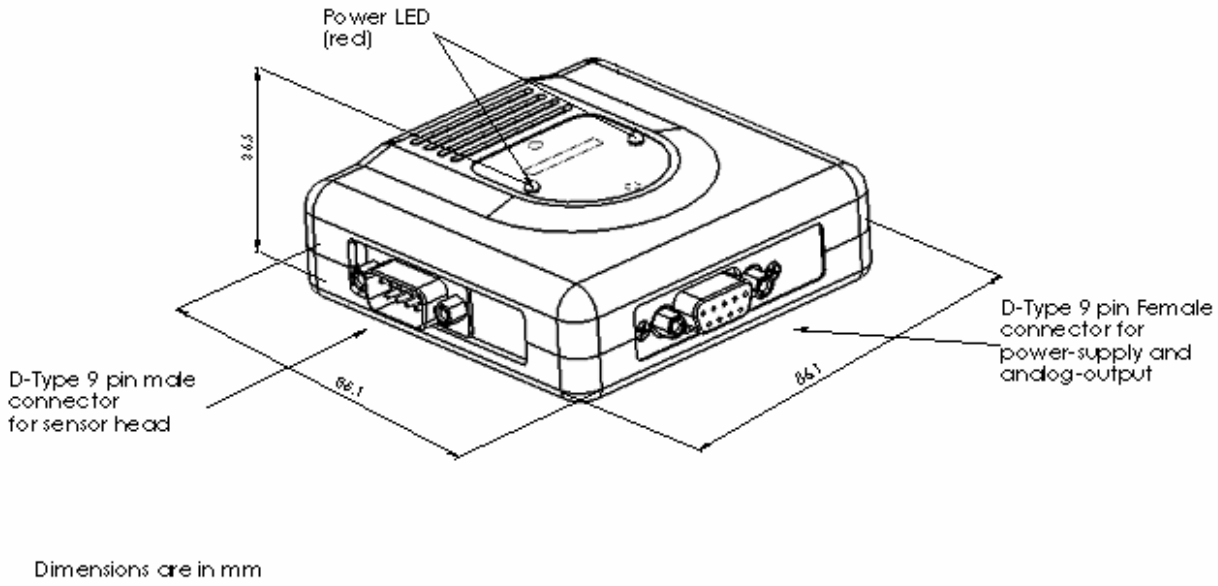

Figure 3: Electronics Box

4.0 Operation

Before using the OBP device please pay attention to the following issues:

- The input beam should not exceed 100mW/cm2, otherwise the electronics/detector might be damaged.

Timing Diagram

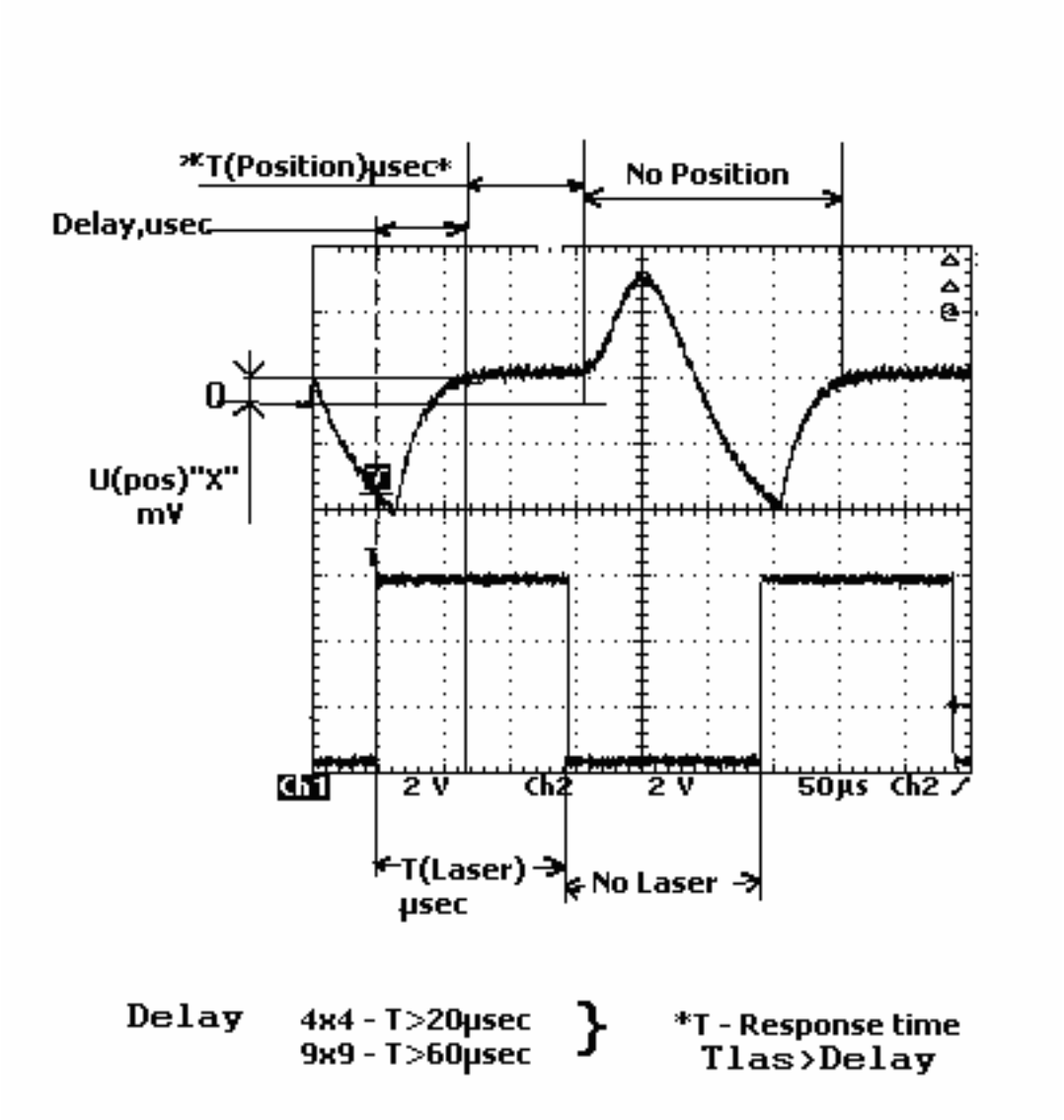

Figure 4: Timing Diagram

4.1 Output Schematics

The following block diagram illustrates the connection and operation method of OBP system:

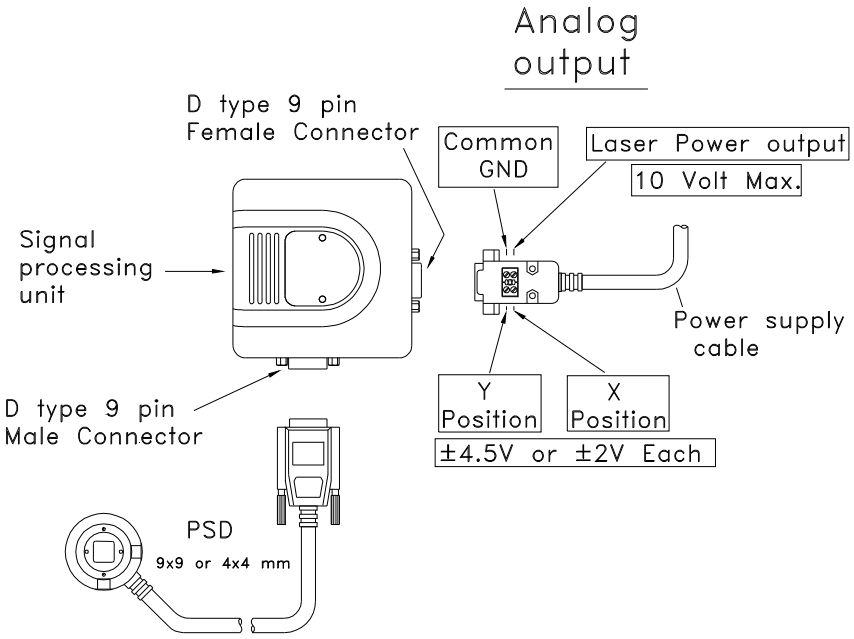

Figure 5: Connection method of OBP

- Connect the power supply
- Connect two Voltmeters, one for X measurement and one for Y measurement. Alternatively, you can connect a dual-channel Voltmeter
- Connect the PSD head to the manifold box
- Place the laser beam in front of the PSD, while making sure the beam is shined exactly at the detector' center
- Make sure that the laser power is not exceeding the OBP model (High Attenuation / Low Attenuation, see Specifications section 2.0)

Things need your attention before conducting a measurement:

- Make sure the beam is aligned close to the detector' center and not shined at the detector' edges

- Make sure the two LED's on the manifold box are lighted up. If not – there might be some fault operation of the unit, or a wrong voltage was applied
- Make sure the PSD is not saturated, if necessary mount a filter in front of the PSD. Saturating non-linear effects might occur (see General Specifications).

  Check saturation at Power Pin; if reading exceeds 10V than the electronics is saturated.
- Make sure there is no ambient light affecting your measurement, check the ambient light at Power Pin (the voltage output value should be held to ±10 mV). Design an appropriate light-shielding to maintain this illumination level, or use the hood offered as the system' accessories.

The following diagrams present the effect of ambient light on the measurement accuracy:

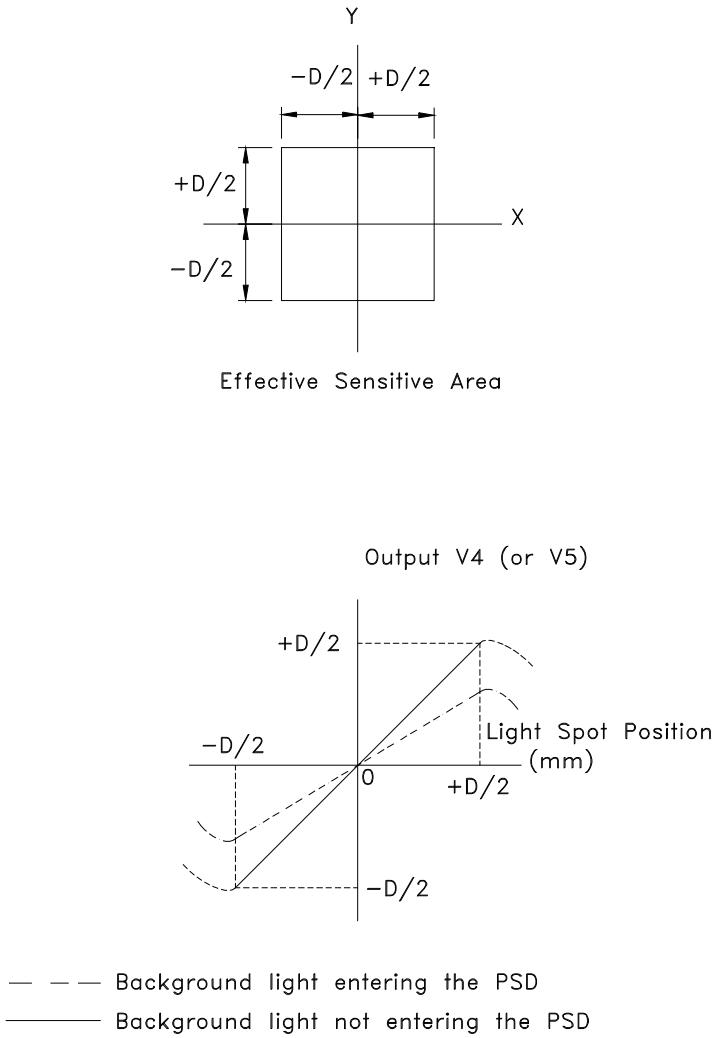

Figure 6: Ambient light effect on measurement accuracy

5.0 Accessories

- A variety of ND filters in housing (C-Mount). Filters include: NG4, NG9, NG10
- Additional hood (55mm length) for ambient light suppression is included in all models.
- The power supply is provided with 2 cords: one for 110Vac and one for 220Vac.

6.0 Troubleshooting

- **No measurement:**

  Check that your laser beam is On and shined into the PSD center

  Check that your laser beam power is above 40 mV

- **Erroneous measurement**

  Check that your beam is not saturated, mount an ND filter if necessary

  Check that the ambient light is not reaching the PSD and provide a proper light-shielding

  Check the timing diagram and compare to your beam pulse width: the pulse width should be bigger than the response time

- **No LED light on manifold box**

  Check that your power supply is connected properly and is On

  Check the voltage connection (check that +/- polarization was not switched)

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